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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,884	08/25/2003	Hsiang-Lan Lung	9761-US-PA	1883

31561 7590 11/18/2004

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE  
7 FLOOR-1, NO. 100  
ROOSEVELT ROAD, SECTION 2  
TAIPEI, 100  
TAIWAN

EXAMINER

PHAM, THANH V

ART UNIT PAPER NUMBER

2823

DATE MAILED: 11/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center"><b>Office Action Summary</b></p>	Application No. 10/604,884	Applicant(s) LUNG ET AL.	
	Examiner Thanh V Pham	Art Unit 2823	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 September 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 1-9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Response to Amendment***

1. The amended Title filed 09/27/04 is accepted.

***Claim Rejections - 35 USC § 102***

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 10-15 and 18-24 are rejected under 35 U.S.C. 102(a) as being anticipated by Batra et al. US 2003/0235064 A1.

*Re claim 10*, the Batra et al. reference discloses a method for fabricating a non-volatile memory cell, figs. 3-7, comprising: providing a substrate 21; sequentially forming a first insulating layer 22, a metal oxide layer 23 and a second insulating layer 24 on the substrate; performing an annealing to convert the metal oxide layer to a plurality of metal nano-particles with thermal dissociation [0021], while the first insulating layer, the second insulating layer and the metal nano-particles together constitute a charge-trapping layer [0022]; forming a gate 25 on the charge-trapping layer; and forming a source/drain 26/27 in the substrate beside the gate.

*Re claim 11*, the Batra et al. reference's claim 40 discloses the method further comprising forming several metal oxide layers and insulating layers on the second insulating layer so that multi layers of metal nano-particles are formed with the annealing.

*Re claims 12-15 and 23*, the Batra et al. reference discloses the annealing is conducted under vacuum from 200-800 °C, the noble metal oxide layer is formed by

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CVD, ALD or PVD [0021], platinum is preferred over ruthenium in forming the oxide for the metal oxide layer, [0008].

*Re claims 18-19*, the Batra et al. reference discloses the size of the metal nanoparticles are less than about 5 nm in between a tunnel oxide of 1.5 nm or less and control oxide of 7 nm or less, [0003].

*Re claims 20-22 and 24*, the Batra et al. reference discloses the first and second insulating layers comprise different or the same material of  $\text{Al}_2\text{O}_3$ ,  $\text{HfO}_2$  or  $\text{ZrO}_2$  or both comprise silicon oxide, [0008], [0022], or claims 15-19.

### ***Claim Rejections - 35 USC § 103***

4. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batra et al. as applied to claims 10-15, 18-24 above, and further in view of Wolf, Vol. 1, pages 340-359.

The Batra et al. reference discloses all of the limitations of the instant invention but lacks the oxygen flow rate of 15 sccm, the sputtering pressure of 20 mTorr and a sputtering rate of 2 nm/min in the reactive sputtering process and the time length of the annealing. However, choice of temperature, partial pressures of the gas and the time length of annealing would have been a matter of routine optimization as recognized by Wolf (page 314, e.g.) in the process of sputtering, because temperature, pressure and timing are known to affect device properties and would depend on the desired device characteristics. One of ordinary skill in the art would have been led to the recited temperature and pressures through routine experimentation to have a sputtering rate of

2 nm/min and the recited timing of 60 minutes annealing within the range of 200-800 °C of Batra et al. to achieve the desired deposition and reaction rates.

### ***Response to Arguments***

5. Applicant's arguments filed 09/27/04 have been fully considered but they are not persuasive.
6. Re claim 10, applicant points to the correct paragraph of Batra et al. as in the previous Office action but interprets incorrectly. The step of depositing platinum which "is reacted with oxidizing gas such as O<sub>2</sub>" would yield platinum oxide and the "addition" step wherein "the substrate may be annealed at a temperature of from about 20 °C to about 800 °C" would "convert the platinum to small nano-crystalline beads" which clearly anticipate the claim.
7. Re claim 11, applicant re-quotes correctly the one *advanced dielectric layer* but interprets that the advanced dielectric layer is not metal oxide layer. Applicant is directed to paragraph [0003]: "If alternate high dielectric constant dielectrics are employed, the physical film thickness can be greater, as the 'effective' thickness will be less due to the higher dielectric constant of the dielectric material. A high dielectric constant dielectric is one which has a dielectric constant greater than silicon dioxide". This passage shows that the goal of Batra et al. is forming an *advanced dielectric* material by the steps in [0021] using metal such as platinum and oxidizing gas such as O<sub>2</sub> to form a metal oxide as a dielectric material and then annealing the dielectric material to have an *advanced dielectric layer* with metal nano-particle. Batra et al do not

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have to use the exact same language/word/terminology as the instant invention to anticipate the instant claimed invention.

8. On page 6 of the Remark, applicant states: “no *metal oxide layer capable of producing metal nano-particle* is formed in Batra et al.” The step to “convert the platinum to small nano-crystalline beads” in [0021] is this limitation.

9. The argument under 35 USC 103(a) can be addressed as the above.

### **Conclusion**

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


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12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh V Pham whose telephone number is 703-308-2543. The examiner can normally be reached on M-T (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

WP  
TvP  
11/10/04

  
George Fourson  
Primary Examiner